

Claims

1. A composition for use as an adhesive comprising:
an extensin protein; and either
a non-enzymatic bifunctional crosslinking agent; or
a phenol oxidase and a phenol hydroxylase.
2. A composition for use as an adhesive comprising:
an extensin protein;
a non-enzymatic bifunctional crosslinking agent; and
a phenol oxidase and a phenol hydroxylase.
3. A composition according to claim 1 or 2 which further
comprises a cofactor when the composition comprises a phenol
oxidase and a phenol hydroxylase.
4. A method for forming an adhesive which comprises
admixing an extensin protein with either:
an amount of a non-enzymatic bifunctional crosslinking
agent; or
an amount of a phenol oxidase and a phenol hydroxylase
effective for inducing crosslinking of the protein.
5. A method for forming an adhesive which comprises
admixing an extensin protein with an amount of a non-
enzymatic bifunctional crosslinking agent, a phenol oxidase
and a phenol hydroxylase effective for inducing crosslinking
of the protein.
6. A method for forming an adhesive which comprises
admixing an extensin protein either with an amount of a
cofactor, a phenol oxidase and a phenol hydroxylase
effective for inducing crosslinking of the protein or with
an amount of a cofactor, a non-enzymatic bifunctional
crosslinking agent, a phenol oxidase and a phenol
hydroxylase effective for inducing crosslinking of the
protein.

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7. A composition or method according to claim 3 or 6 in which the cofactor comprises a phenolic moiety which comprises at least one of a monohydroxy phenol group or a dihydroxy phenol group.

8. A composition or method according to claim 3, 6, or 7 in which the cofactor is soluble in water.

9. A composition or method according to claim 7 or 8 in which the cofactor comprises catechin.

10. A composition or method according to any of claims 7 to 9 in which the cofactor comprises catechol.

11. A composition or method according to any preceding claim in which the non-enzymatic bifunctional crosslinking agent comprises glutaraldehyde.

12. A composition or method according to any preceding claim in which the non-enzymatic bifunctional crosslinking agent comprises a di-isocyanate.

13. A composition or method according to claim 12 in which the di-isocyanate is Trixene.

14. A composition or method according to any preceding claim in which the non-enzymatic bifunctional crosslinking agent comprises a quinone.

15. A composition or method according to claim 14 in which the quinone is a benzoquinone.

16. A composition or method according to any preceding claim in which the phenol oxidase and the phenol hydroxylase is a tyrosinase.

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17. A composition or method according to claim 16 in which the tyrosinase is a mushroom tyrosinase.

18. A composition or method according to claim 17 in which the mushroom tyrosinase is *Agaricus bisporus* tyrosinase.

5 19. A composition for use as an adhesive which comprises:
an extensin protein;
a cofactor comprising a dihydroxy phenol group;
a phenol oxidase; and optionally
a non-enzymatic bifunctional crosslinking agent.

10 20. A method for forming an adhesive which comprises
admixing an extensin protein with an amount of a cofactor
comprising a dihydroxy phenol group, a phenol oxidase, and
optionally a non-enzymatic bifunctional crosslinking agent
effective for inducing crosslinking of the protein.

15 21. Use of a composition or method according to any
preceding claim for binding substrates together.

22. Use according to claim 21 in which the substrates are
non water-absorbent.

20 23. Use according to claim 21 in which the substrates are
water absorbent.

24. Use according to claim 21 in which the substrates
comprise a non water-absorbent substrate and a water
absorbent substrate.

25 25. Use according to claim 22 or 24 in which the non water-
absorbent substrate or substrates comprise at least one of
metal or plastic.

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26. Use according to claim 23 or 24 in which the water absorbent substrate or substrates comprise at least one of wood, leather, cotton, paper, carpet, or textile.

27. Use according to claim 21 as a binder of particulates.

5 28. Use according to claim 27 in which the particulates comprise at least one of sand or glass fibre.

29. Use according to claim 21 as an undercoat to a coating.

30. Use according to claim 29 in which the coating is a paint.

10 31. Use according to claim 29 in which the coating is an adhesive.

32. Use according to claim 21 as a suture for closing a wound.

15 33. Use according to claim 32 in a method for closing a wound.

34. Use according to claim 21 as a gelling agent in food products.

20 35. A pharmaceutical composition comprising a pharmaceutically active ingredient and a crosslinked adhesive composition according to any of claims 1 to 3 or 7 to 19.

25 36. A kit for manufacture of an adhesive, the kit comprising separate components, wherein admixture of the separate components forms an adhesive composition according to any of claims 1 to 3 or 7 to 19.

37. A kit for manufacture of an adhesive that comprises separate first and second components, the first component

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comprising an extensin protein, the second component comprising: either
a non-enzymatic bifunctional crosslinking agent; or
a phenol oxidase and a phenol hydroxylase and optionally a cofactor;

wherein admixture of the first and second components forms a composition according to any of claims 1 to 3 or 7 to 18.

38. A kit for manufacture of an adhesive that comprises separate first and second components, the first component comprising an extensin protein, the second component comprising a non-enzymatic bifunctional crosslinking agent and a phenol oxidase and a phenol hydroxylase and optionally a cofactor, wherein admixture of the first and second components forms a composition according to any of claims 2, 3 or 7 to 18.

39. A composition for use as an adhesive substantially as described with reference to figure 2 of the accompanying drawings.

40. A method for forming an adhesive substantially as described with reference to figure 2 of the accompanying drawings.

41. A kit for manufacture of an adhesive substantially as described with reference to figure 2 of the accompanying drawings.